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THE NATURE AND STATUS OF BUSINESS RESEARCH¹BY LEONARD P. AYRES, *The Cleveland Trust Company*

The job of the business statistician is to look into the future. He is employed to furnish those in positions of top control in his firm with a fact-basis for their thinking and acting. If he can do this successfully he becomes one of the most valuable men in the organization. His is a difficult and an exacting job, for it involves a most unusual combination of theoretical knowledge with the ability to transform his theory into recommendations for practical action.

The university economist and the governmental statistician are seldom called upon to submit their conclusions to the immediate and drastic test of application. The successful business man is usually innocent of any thorough understanding of the economic laws affecting his operations, or of the statistical technique by which the lessons of previous transactions may be interpreted. It is the business statistician who is called upon to bridge the gap between knowing and doing.

Because they fall short of measuring up to these high requirements, business statisticians have in general failed to take positions of large influence in commerce, industry, or finance. Most of the larger and many of the smaller industrial firms have statistical departments, but in only a few instances have the men in charge become influential factors in the business world. More serious still is the fact—which must become apparent to any one who has occasion to study the finances of business establishments in these troublous times—that in few cases has the work of the business statistician exercised any large influence within his own organization. It is worth while to seek the causes of these conditions.

THREE DIVISIONS OF WORK

The work of the business statistician in the industrial establishment is closely related to the three great divisions of the firm's own activities. The first of these relates to the purchase of raw materials, the second to production, and the third to the sale of the output. In each case the task of business research is to study the figures of the past and the present, and from them to draw just inferences as to the probable future. The terms in which this work is done are those of time and

¹ Read at the Eighty-third Annual Meeting of the American Statistical Association at Pittsburgh, Pa., December, 1921.

money. The importance of business research depends on the degree to which it can increase money returns. The value of the business statistician is measured by his effectiveness in swelling the firm's income. The results of the work must lead to recommendations relating to profits.

When these conclusions and recommendations are formulated they are submitted to the immediate test of events, and if they are erroneous that fact becomes not only obvious but frequently expensive. There are few fields of endeavor in which the requirements are so severe, the controlling factors equally numerous and uncertain, and the validity of the work so promptly and definitely determined.

THE GENERAL BUSINESS CYCLE

The most important single piece of business information at any given time is that which tells of the existing status and development of the general business cycle. This means that the business statistician must have a thorough acquaintance with the literature of this subject and a pretty incisive understanding of current developments as they become active factors in the cycle's development. This single requirement entails a good education, a fair grounding in economics, and a considerable command of statistical technique.

THE BUSINESS CYCLE OF THE INDUSTRY

Supplementing this foundation of knowledge relating to the general business cycle, he must have an intimate and constantly growing knowledge of the business cycle of his own particular industry. He must realize such facts, for example, as that when prices are changing in response to general business movements, those of cotton goods fluctuate more widely than do those of woolen goods, and that both of these normally swing through a wider range than do the prices of leather goods. He must discover and develop for his own industry facts of this general sort, and he must by careful test and study find out which among them are trustworthy general laws, and which are merely contingent and incidental occurrences.

He must carry his studies further and bring to light for his own business those apparently contradictory counter currents that disturb the laws of business when the general tide is setting strongly in toward prosperity, or ebbing to depression. Such contradictions are found when incomes are reduced and people begin to use more cotton but less wool, or more flour but less meat, or when they stimulate the paint business because they have suddenly decided to make their old rolling stock or agricultural implements serve one more year. Again, in-

times like the present, the business of companies manufacturing multi-graphs and similar machines is increased because firms feel the necessity for advertising but wish to do it in an inexpensive manner.

THE MONEY MARKET

Still other fundamental conditions with which the business statistician must be familiar are those relating to the money market. He should know something of the seasonal fluctuations in the cost of short-time borrowings, and a good deal about the laws which govern the expense of capital issues through stocks and bonds in periods of falling prices, as contrasted with those of rising prices. This is a requirement of the first calibre, but knowledge of this field should be included in the equipment of the business statistician if he is to make his work a true profession and demand that it be accorded a first-class status.

WAGES AND THE COST OF LIVING

In the parts of his work which more directly relate to the operations of the establishment the business statistician will find that he must keep conversant with the movements of the index numbers for wages, employment, and the cost of living. Every time a change in rates of pay is under discussion he will be called on for information, explanation, and forecasting in these fields, and he will find, if he has to deal with progressive labor organizations, that no superficial knowledge or hasty generalizations will meet the needs of the case.

ESTIMATING FUTURE DEMANDS

In addition to all that has been outlined there remains one more kind of activity, involving more real research, calling for greater sagacity, and requiring a higher type of ability. This is the estimating of the probable future demand for the output of the establishment or industry. One main reason why we have business cycles is that business men are commonly unsuccessful in making these estimates.

This work necessitates in part an application of actuarial methods to the data of markets and distribution along lines that have as yet hardly been marked out. These methods are needed especially in connection with articles which are quickly developed and which meet so generally felt a need that large numbers of people desire to secure them promptly. Among such articles may be mentioned harvesting machines, typewriters, bicycles, phonographs, and automobiles.

In the cases of such articles there are two distinct phases in the development of markets. The first is that which the supply departments of the army termed during the war the "problem of initial

equipment." It consists in furnishing large numbers of people with the new article quickly. The second phase is that of replacement, and consists in supplying old customers with new machines after their original purchases have been worn out or superseded.

The fact of outstanding importance about these two phases is that the productive capacity that is built up to meet the demands of initial equipment is nearly certain to be greatly in excess of that which can possibly be used when the market becomes one of replacements. The laws governing these industrial changes are largely susceptible of statistical formulation. The principal controlling factors are the number of users, the annual output of the industry, and the average life of the article. The possibilities of export trade, and the degree to which old models can be superseded by new and improved types, are additional factors.

The formulation of the laws that are involved for any particular industry or product calls for incisive and sequential thinking based on carefully collected and accurately recorded information. Such work well done will yield returns of the first importance.

DETERMINATION OF TRENDS

The estimating of future demand is quite as essential in the cases of articles and commodities that do not have the characteristics of those just considered. Here again methods have been but imperfectly formulated, and the work that remains to be done will call for the best ability that statisticians can bring to bear. This work depends largely on the estimating of long-time or secular trends. It is essentially a matter of prophesy. To deal with it adequately the research statistician will require a good working knowledge of correlations. He will need this not so much because the correlations themselves will have to be computed, as because he will need to use the regressions which are involved in the correlations.

These regressions are measures of trends. In their very nature they are prophecies and, if judiciously used, they throw open to the field of business research a series of devices which have only recently become commonly available, and which have a most important practical value.

Moreover, there are some cases, and most important ones in the business field, where still more complicated techniques will justify themselves in the practical results they will bring to light. These are cases in which the result that is sought depends on the magnitudes of two or more controlling factors that may be measured in advance. For example, the probable volume of certain crops may be estimated in advance from the figures of temperature and rainfall recorded during

the spring and early summer. The making of such estimates involves the use of regressions from multiple correlations. This methodology, which is still in the stage of development, will later on be used for estimating the probable future demand for commodities and manufactured articles.

A NEW PROFESSION

The types of work that have been described as included among the activities of the business statistician call for thorough training, a wide range of knowledge, and a considerable amount of resourceful ingenuity, combined with an unfailing ability to turn out results of practical usefulness. They are not merely economics, although a good grasp of economics is involved. They are not entirely statistics, although they require a high grade of statistical ability. They are not exclusively research, although they include real research of an exceptionally applied sort.

More and more work of this sort is going to be done. The need for it is almost without limit. The materials and methods for carrying it forward are at hand in a profusion entirely beyond anything that existed or could be foreseen even five years ago. Persons with the requisite training and ability to carry it forward are beginning to appear. Probably it constitutes a new profession, included within statistics, but sufficiently specialized to demand individual recognition.

BUSINESS STATISTICS TRADITIONALLY CLERICAL

It must be admitted that for the most part statistical work in business organizations is not now being carried forward on anything like the levels that have been suggested, nor are most of our business statisticians competent to do the kinds of work that have been described. It is probably true that most of the business statisticians in American industries have come up through the clerical or accounting forces and have been given the title of statistician because they proved a little more able than their fellow workers to compile rapidly the information demanded from time to time by the executive officers.

The status of the statistician in business depends on the capacity he may possess to free himself from the clerical traditions that surround his position. So long as it is his job to produce the figures that are called for as promptly as possible, and hand them over to his superior officers to interpret and apply, his office will remain one of relatively limited importance.

He will carry forward real research only as he finds or makes opportunities to do his work by scientific methods, and this involves in

business, as elsewhere, the four processes of analytic scrutiny, exact measuring, careful recording, and judgment on the basis of observed fact.

INTERPRETATION

Two conditions are necessary if the work of the business statistician is to be carried forward on productive scientific lines. The first is that his office shall be one of interpretation and presentation, rather than one charged with the duty of compiling primary records. His job is to sort out the essential facts from the great mass of merely incidental ones, and to interpret their significance. He must have time to study, combine, and compare his figures, and to point out their meaning. If he is mostly concerned in tabulating, or in supervising a force of clerks that are doing it, he will not have much time or opportunity for his real job.

PRESENTATION

The second requisite condition is that he shall personally present his results to those who must base actions and policies upon them, and he must participate in the discussions concerning them. By no other method can the value of his work be fully utilized, and there is no other process that is equally effective in improving its quality.

GRAPHIC METHODS

If the research statistician in business is to present and explain his results to officers' committees, executive committees, and boards of directors he will have to cultivate the ability to write simply, to speak with lucid brevity, and to use graphic methods skillfully. The last of these three requisites is by no means the least important. It may be laid down as almost a fundamental principle that the statistician who is to be successful in business must cultivate the graphic methods. He will shortly find that numerical relationships that are at all involved cannot be understood by many business men unless they can see them represented by lines and surfaces instead of by numbers. This requires the use of diagrams.

REWARDS AND REQUIREMENTS

It may appear that unreasonable demands have been made in the foregoing pages on the research statistician in business. He must be a well-trained statistician, with a good knowledge of economics, and a working acquaintance with accounting. He must speak and write convincingly, and know how to use diagrams effectively. He must be

well endowed with that type of sound judgment that will insure the practical utility of his findings and recommendations.

These demands are not unreasonable, for business needs men of these qualities in its statistical positions, and it is abundantly able to pay them well. There is hardly a large corporation in America that would not find it to its advantage to employ such a man, if it could find him, and to give him the status and pay of a vice-president or an executive officer. This opinion is reinforced by the mass of evidence now coming to light indicating that many scores of business concerns are now in financial difficulties as a result of their entire disregard during the past two years of rather elementary principles concerning such things as price movements, interest rates, and the sequence of events in previous business cycles.

It may fairly be asked of the statistician that if he aspires to such a position in business as the truly competent man should be able to secure, he give evidence of his capacity through technical preparation, and by contributing to the published literature of his profession articles on statistics and business research that can successfully bear the critical scrutiny of his professional co-workers. In proportion as business firms demand such standards and reward them, and statisticians equip themselves to meet them, business research will move forward to its rightful place among the professions. That place will be a high one.

DISCUSSION¹

By C. S. DUNCAN

With the paper of Mr. Ayres', both as to its letter and its spirit, I am in hearty accord. It is, however, a high standard that he sets, which probably must remain for some time an ideal or a goal rather than a realization. I do not like the term "business statistician" as applied to the work of business research. The generally accepted meaning of statistician is, in my opinion, entirely too narrow for the one engaged in economic research. There are many occasions when statistical material and statistical methods would be of subordinate consideration.

The man engaged in business research may become the guide, philosopher, and friend of the management, or he may remain in a much lower, clerical position. In my judgment, persons who come into this field of endeavor will rather generally find their own level. If they are clerical minded, they will probably remain clerks. If they have executive or directive ability, they will doubtless reach positions of authority. In general, the research worker in business, like every one else, will achieve the success that his ability can win for him.

¹ Also read at the Annual Meeting.